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TECHNICAL PUBLICATION NUMBER 41

## THE SANITATION OF SWIMMING POOLS



REDONDO BEACH BATH HOUSE, LOS ANGELES, CALIFORNIA

*One of California's most popular swimming resorts.*

### SWIM!

Is there anything more invigorating—anything healthier than a good swim? Today everybody swims and swimming has become one of the major and most popular sports!

Sanitary science has played a vitally important part in this. Beautiful pools, filled with clear, sparkling water invite us—make swimming attractive—and today the swimming pool is an adjunct of all the better playgrounds, schools, clubs, hotels and private estates.

The first public pool in North America was opened in New York City in 1901.

The swimming pool idea was slow to develop but through the efforts of the American Association for Promoting Hygiene and Public Baths, and in later years through the interest of the Amateur Swimming Associations, swimming pools have now become tremendously popular. Today hundreds of them are being constructed throughout the country and nearly every community boasts of a public pool.

It is obvious that the swimming pool presents a problem in public health. This has been met by Public Health officials and sanitary engineers combining in the

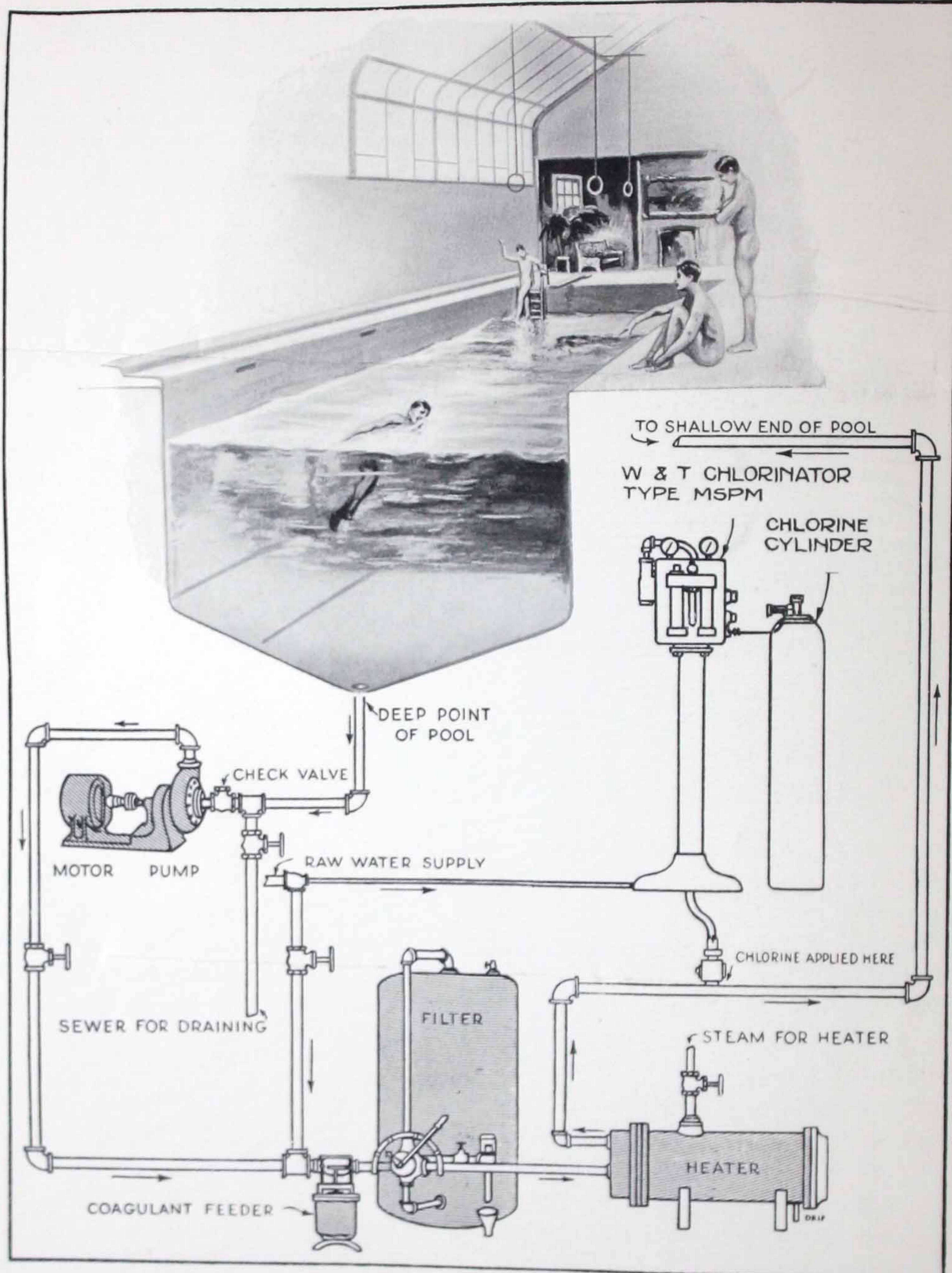


The water is pumped by a small motor driven centrifugal pump through a pressure filter, to effect clarification. It then passes through a thermostatically controlled heater. Chlorine is then added.

Purified, both physically and from a sanitary standpoint, the water again enters the pool.

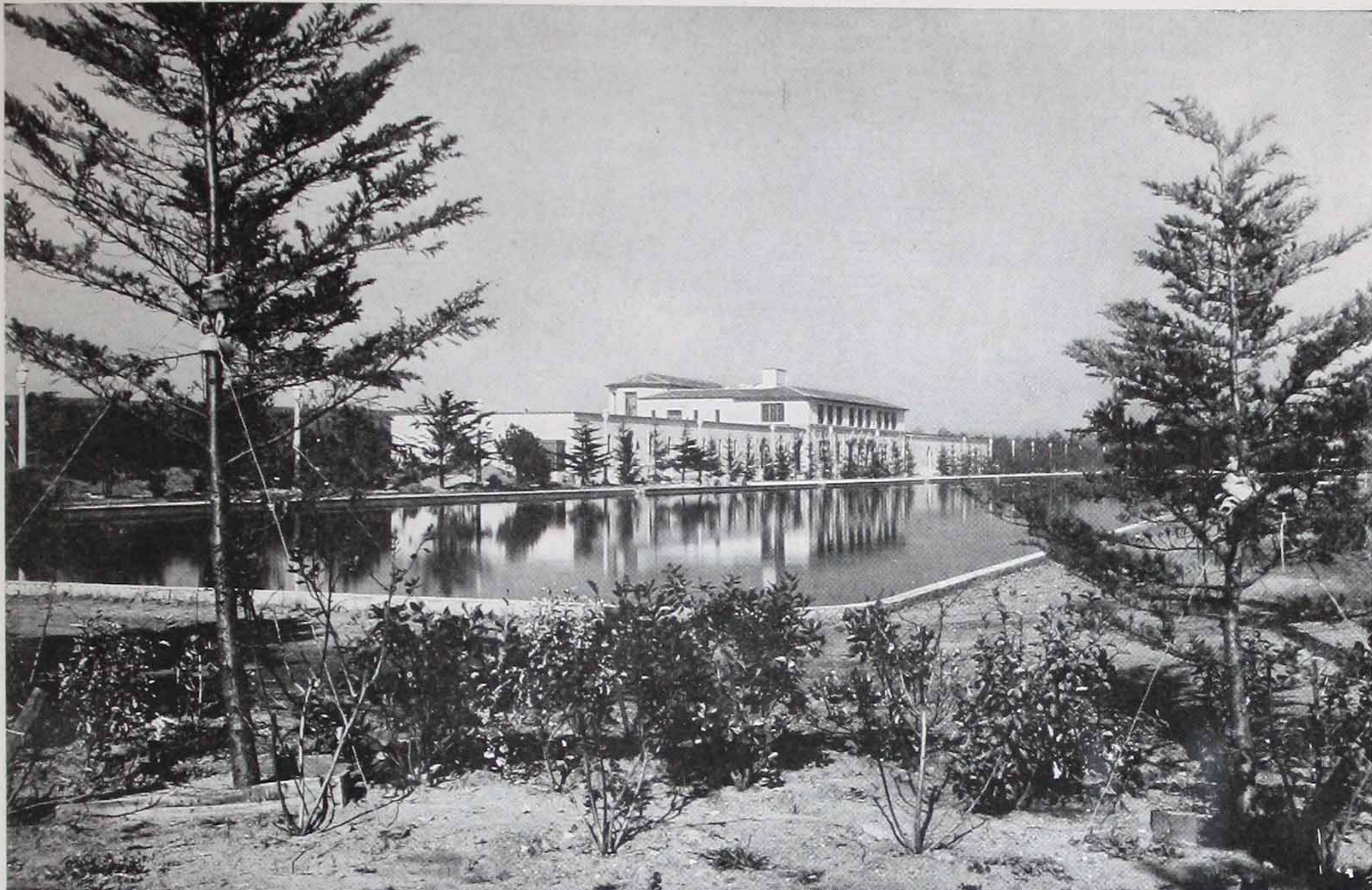
This operation may be kept up indefinitely; additional water need be added only for the purpose of making up the loss due to evaporation and waste through the scum troughs. The water at the end of six months is often better than when introduced into the pool.

We are prepared to study your swimming pool conditions and to furnish, without obligation, estimates on chlorine control apparatus and all other equipment necessary for a recirculating system, conforming to the highest sanitary standards.



A TYPICAL SWIMMING POOL RECIRCULATION SYSTEM

WORTH & VINEYARD  
AIR COOLING



FLEISHHACKER MEMORIAL POOL, SAN FRANCISCO, CALIFORNIA  
*One of the largest and most beautiful pools in the world*

development of modern methods of swimming pool water purification.

If each individual could have a private pool for his sole use, with a constant inflowing stream of pure water, swimming pool purification would be unnecessary. But—just as soon as the pool is used by others a health problem is presented, for contamination from one bather pollutes the entire pool and comes in contact with every other bather. And as the bathers increase in number—or as it is technically termed, the greater the bathing load—the more acute is the health problem.

It has been with this in mind that State Departments of Health and Municipal Health Organizations have adopted regulations governing the sanitation of swimming pools and made provision to super-

vise their proper operation. In the interest of public health this is essential.

It has long been recognized that the swimming pool can be a medium for the transmission of disease\* unless complete, continuous means for the purification of the water are adopted, and so, the modern public health engineer in assisting an architect in the design of a swimming pool, specifies the installation of a complete water purification system—in no sense differing in principle from the water purification systems installed by most of our American municipalities.

These pool water purification systems

\*Atkin—Proceedings Illinois Water Supply Association, 1911.  
Bunker & Whipple, Physical Education Review, 1913.  
Levine—Journal of Infectious Diseases, 1916, Vol. 18.  
1921 report, Committee on Swimming Pool Sanitation, American Public Health Association.



are based on the use of the water over and over again. The water is circulated continuously through the purification system, regenerated, purified, sterilized and returned to the pool. The purification system must be so installed and operated that the water in the pool is just as pure as the water drawn from the faucet at home.

"Swimming pool water," says the Surgeon General of the United States Army, "is essentially drinking water and must be measured by drinking water standards." The drinking water standards of the U. S. Public Health Service limit the bacteria to 100 per cubic centimeter, and in effect insist that the colon bacillus (the sewage germ) be absent in 100 cubic centimeters (3.4 ounces).

A properly operated filter will remove all of the dirt, color, turbidity and suspended material from the water and will deliver a clear, sparkling water to the pool. But a filter will *not* destroy the germs that are washed from the body of the bathers into the pool water,—it will *not* destroy the microbes of disease that might get into the water from one bather, which when transmitted to other bathers cause disease.

Just as health authorities have found that municipal drinking water must not only be filtered but must also be *sterilized*, so, in the case of swimming pool purification the water must be sterilized. There is no possibility of disease being transmitted by a *sterilized* swimming pool water. Filtration alone *cannot* give a sterile water,—and so today we find that swimming pool sterilization is a standard requirement contained in all health regulations pertaining to swimming pool sanitation.

If you ask health authorities,—"What is the best method of sterilization?" they will answer—

*"Chlorination!"*

And this because chlorination and chlorination alone, provides *continuous* sterilization throughout the entire pool. Bear in mind that the filtered, sterilized water, the moment it enters the pool and comes in contact with a bather, is again liable to pollution which will carry through the pool, increasing as the water nears the outlet. Some means must be provided to destroy this pollution and prevent the possibility of it spreading disease during its travel through the pool.

This is accomplished by chlorination.

A properly operated pool will have in the pool water at all times, just sufficient residual chlorine to destroy the microbes of disease. There is not enough to be noticed—the most sensitive bather cannot detect it. But there *is* enough there to kill a germ that is washed from the body or mouth rinsings of one bather *before* that germ can come in contact with another bather!

That is why health officials everywhere endorse chlorination. That is why the Joint Committee on Bathing Places of the American Public Health Association and the Conference of State Sanitary Engineers, after five years careful study states: "From all available information, the addition of chlorine . . . by the use of proper apparatus, is today the most satisfactory method of pool disinfection. . . ."

And just as chlorination is the accepted and preferred method of swimming pool sterilization so is Liquid Chlorine and W&T apparatus the preferred method of chlorination. That is because liquid chlor-



CRYSTAL POOL, WOODSIDE PARK, PHILADELPHIA, PENNSYLVANIA

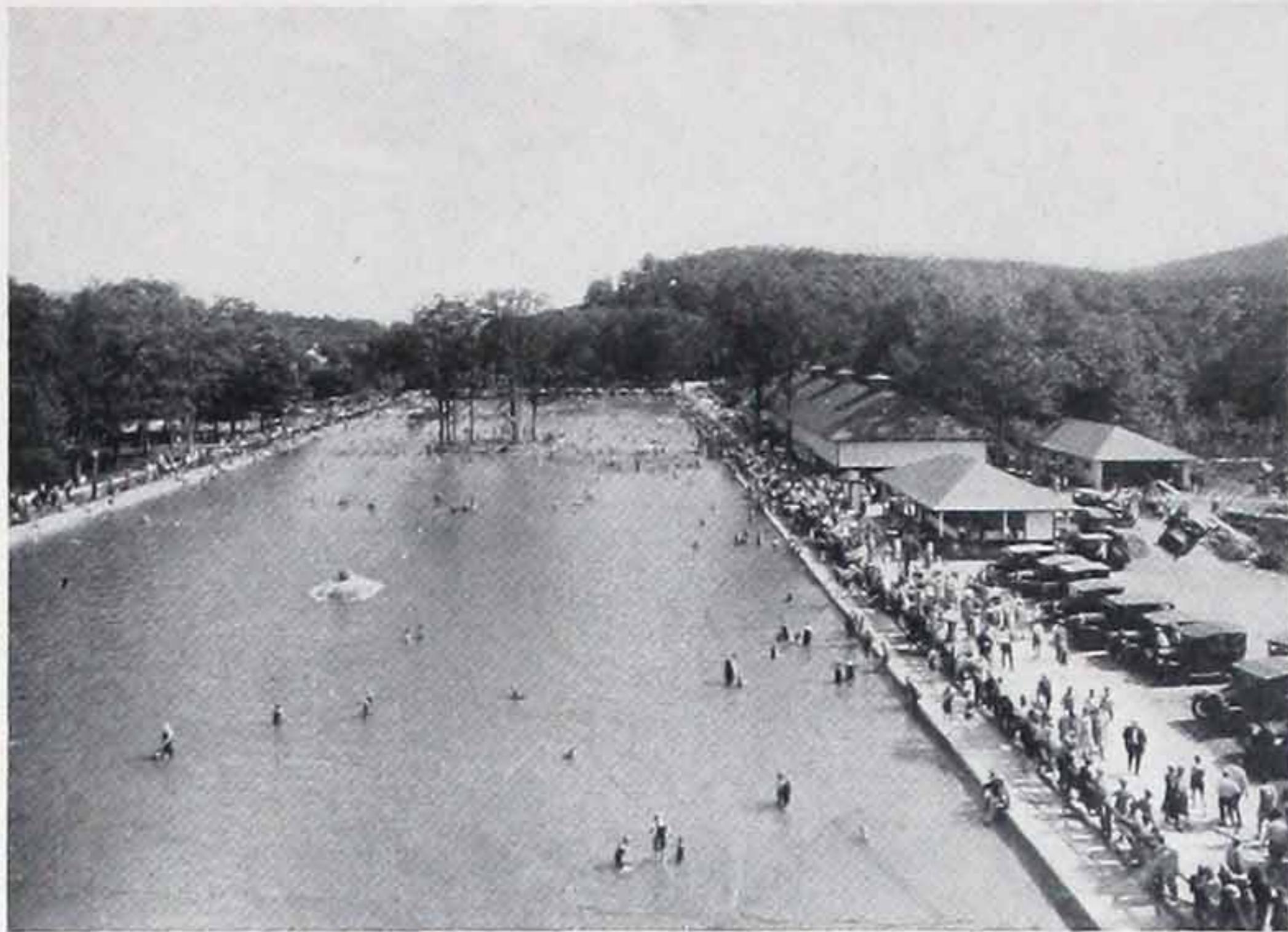
ine is easily handled, always full strength, universally available, while the W&T sterilizer for controlling the application of the liquid chlorine is automatic, fool-proof, simple, durable. Once placed in operation it stays in operation.

Liquid chlorine and W&T swimming pool sterilizers remove the guess work from swimming pool sanitation.

The sterilization of water by liquid chlorine and W&T equipment is thoroughly established. There are over 6,000 installations of W&T apparatus, sterilizing upwards of five thousand million gallons of drinking water each day. Every

drop of drinking water delivered to over 3,000 communities in North America is sterilized with liquid chlorine. These public water supplies through chlorination meet the requirements of the United States Public Health Service for drinking water—while in just the same manner, in close to a thousand swimming pools protected by W&T sterilizers, the bathers are swimming in water fit to drink.

The almost universal use of W&T apparatus and liquid chlorine to sterilize public water supplies and swimming pool water has brought about Wallace & Tiernan's country-wide organization of trained



MUNICIPAL POOL, ALTOONA,  
PENNSYLVANIA

public health engineers, each thoroughly conversant with all problems of water purification and each available to co-operate without charge with architects, engineers and owners interested in swimming pool sanitation.

Twenty-seven District Offices and Service Headquarters maintained throughout the country, makes it convenient to reach any customer on short notice.

## W&T Chlorine Control Apparatus

W&T apparatus scientifically applies the chlorine to the pool water with absolute reliability—just the amount of chlorine desired, not a bit more and not a bit less. Quantities of chlorine as small as five-one hundredths of a pound in 24 hours (.000006 pounds per second) can be accurately controlled.

There are no moving parts to get out of order or adjustment. You can always see the chlorine flowing. The chlorine meter is

hydraulic in principle; if it operates at all it operates correctly. There are no electric switches or coils to get out of order; no delicate lamps to be continually burning out.

The apparatus is portable. It is shipped completely assembled and ready for operation. Installation is a matter of hours and minutes, not of weeks and days. The apparatus may be installed at any convenient point. No special preliminary layout work is necessary, an important factor to be considered by architects and designing engineers inasmuch as it simplifies the preparation of their plans.

For the majority of pools our Manually Controlled, Solution Feed—known as Type MSPM—chlorinator is applicable. This apparatus has a maximum capacity of 10 lbs. of chlorine per 24 hours—enough to handle pools up to 500,000 gallons capacity ordinarily.

In this type apparatus chlorine gas is first mixed with an auxiliary water supply in the machine and the resultant chlorine solution applied to the filter effluent line, if recirculation is used, or to the inflowing water, if the pool is of the fill and draw type. In order to overcome the slight pressure that may exist in the filter effluent line an injector is used.

The auxiliary water pressure must be four times greater than the pressure at the point of application of the chlorine solution, and at least 15 pounds per square inch. With a pool of the fill and draw type, an injector is not ordinarily needed.

For beaches, lakes and large outdoor pools, we have developed a Chloro Boat for efficiently applying the chlorine. Full particulars will be given on request.



## The W&T Swimming Pool Sterilizer Type MSV

THE most efficient sterilizer for large pools—particularly adapted to outdoor pools with heavy bathing loads.

A regular man-sized chlorinator—rugged—damage proof—easy to operate—reliable and accurate.

Average maintenance cost less than 1 per cent per year.

Over 2,000 units of this type are installed and in operation sterilizing drinking water.

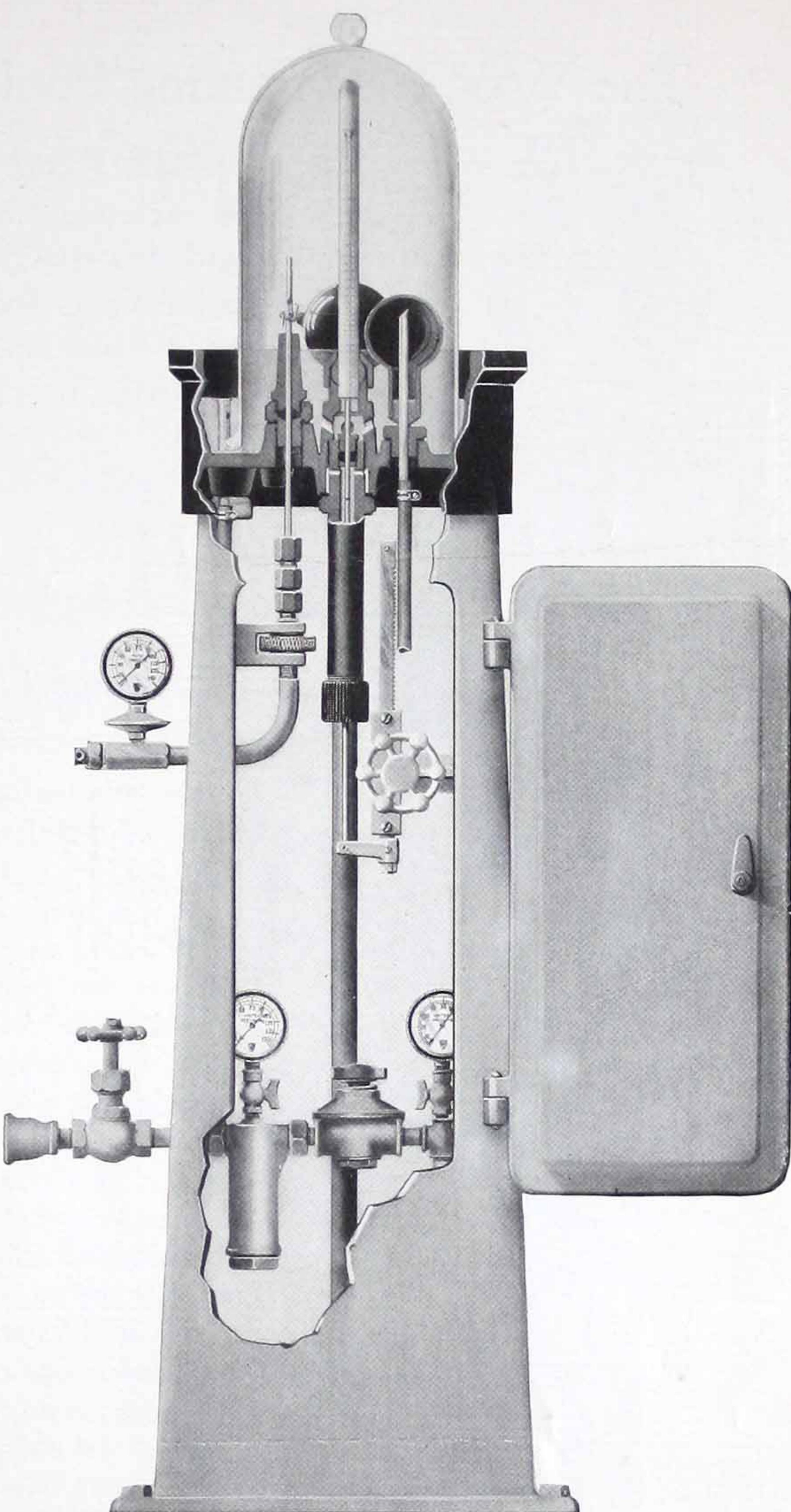
### Specifications

#### *Manual Control Chlorinator Vacuum Solution Feed Type MSV or MSVM*

The chlorinator shall be a self-contained unit with cast-iron pedestal mounting and equipped with vacuum float-operated chlorine pressure reducing and constant flow valve located under a glass bell jar resting in a hard rubber tray which shall operate to cut off the flow of chlorine should the water supply to the apparatus accidentally fail.

A visible meter of the orifice type located under the bell jar shall measure the flow of gas under vacuum and shall not show a greater variation than 4 per cent from the true delivery of chlorine on all flows within the working range of the meter.

The equipment shall contain a chlorine injector which shall discharge the chlorine solution to the point of application. An air relief trap of the ball-float type located under the glass bell jar shall prevent water getting back into the gas lines of the apparatus. All control parts of the equipment shall



THE W&T CHLORINATOR, TYPE MSV

be of materials specially adapted for chlorine control and shall be easily accessible for inspection and cleaning.

**GUARANTEE:** The apparatus shall be guaranteed against all inherent mechanical defects for a period of one year from date of shipment from factory.

**HEIGHT:** 57½ inches. **FLOOR AREA:** 20 inches by 24 inches.

**SHIPPING WEIGHT:** 600 pounds.



## The W&T Swimming Pool Sterilizer Type MSP



THE W&T CHLORINATOR, TYPE MSP

THE W&T chlorinator Type MSP, especially developed for moderate size pools—up to 500,000 gallons capacity. Hundreds of units of this big, husky chlorinator are in operation. The semi-vacuum principle used insures long life. Its rugged, flood-proof construction reduces maintenance charges to a minimum.

Its substantial construction and attractive appearance make it an ornament wherever installed.

### Specifications

#### *Manual Control Solution Feed Chlorinator Type MSP or MSPM*

The chlorinator shall be a self-contained unit with cast-iron base and metal support and shall contain a chlorine pressure-reducing and compensating valve which shall maintain a constant flow of chlorine with any one setting of the control valve regardless of varying pressures in the chlorine cylinders.

There shall be mounted on the metal cabinet of the equipment a hard rubber head block which in turn shall support a glass meter jar which shall house a visible volumetric meter of the pulsating type having a capacity range from .5 to 10 pounds of chlorine per 24 hours, or of the bubbling type with a capacity range of .05 to 1.2 pounds per 24 hours. All meters shall be interchangeable and shall not show a greater variation than 4 per cent from the true delivery of chlorine on all flows within the working range of the meter.

The head block shall also support a vacuum relief seal communicating with the chlorine line from the pressure compensator and shall prevent water being drawn back into the gas control parts of the equipment. An injector taking its suction from a glass suction chamber supported from the head block shall discharge the chlorine solution to the point of application. The injector suction chamber shall be provided with a relief to prevent the escape of chlorine gas into the room in the event of accidental failure of the water supply.

A constant level box mounted within the metal cabinet shall supply water to the injector suction chamber and chlorine meter chamber.

**GUARANTEE:** The apparatus shall be guaranteed against all inherent mechanical defects for a period of one year from date of shipment from factory.

**HEIGHT:** 68 inches. **FLOOR AREA:** 20 inch circle.

**SHIPPING WEIGHT:** 375 pounds.



## THE W&T CHLORO-CLOCK

THE W&T Chloro-clock is an equipment for metering and feeding small quantities of sterilizing solution. It operates on the displacement principle, the control being obtained from a clock work mechanism which actuates an arm from which a displacing cylinder is suspended. The rate of feed of solution is adjusted by means of a pendulum mechanism and is arranged so that the contents of the cylinder container can be discharged in 20 hours or 8 days. A water supply under pressure feeds the small constant level box into which the solution drops. The same water supply also operates an injector which draws from the constant level box and applies the diluted sterilizing solution to the desired point of application.

The chloro-clock is started in operation by merely turning on the water supply and moving a lever which starts the clock mechanism in motion. Taking the equipment out of service is done with similar ease.

Aside from the periodic wind-up of the weighted cylinder, filling the container jar and an occasional cleaning of the strainer in the water line, the chloro-clock requires no attention.

### Specifications

The equipment shall be a self-contained unit mounted on a cast-iron base and with suitable metal support. It shall be suitable for feeding a hypochlorite sterilizing solution of definite strength and shall operate on the displacement principle, the control being obtained from a clock-work mechanism which actuates an arm from which a displacing cylinder is suspended. The rate of feed of solution shall be adjustable by means of a pendulum lever so arranged that the contents of the cylinder container can be discharged at varying rates as required from 20 hours to 8 days.

Where the sterilizing solution must be applied against a positive pressure, the equipment shall be provided with an injector operated by an external water supply under pressure and drawing from a constant level float box so placed as to receive the

sterilizing solution that flows from the cylinder container.

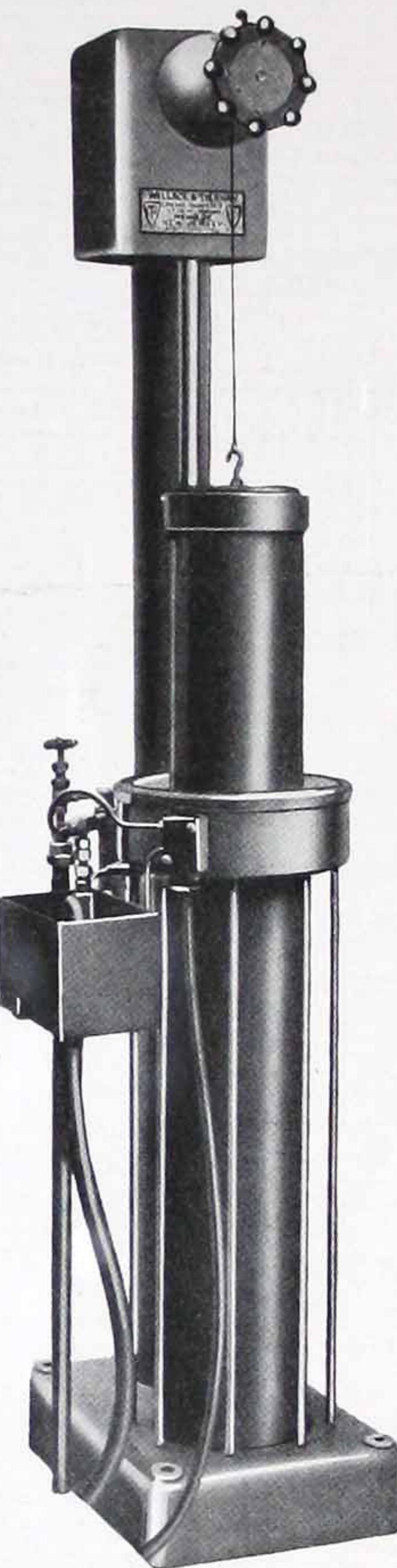
THE W&T CHLORO-CLOCK

All parts of the equipment with which the chlorine sterilizing solution comes in contact shall be of materials resistant to the action of sterilizing solution. All parts of the clock-work mechanism shall be properly protected but easily accessible and so designed that raising the weighted displacement cylinder will automatically wind the clock mechanism.

**GUARANTEE:** The apparatus shall be guaranteed against all inherent mechanical defects for a period of one year from date of shipment from factory.

**HEIGHT:** 67 inches. **FLOOR AREA:** 16 inches by 18 inches.

**SHIPPING WEIGHT:** 400 pounds.





## Partial List of Wallace & Tiernan Swimming Pool Installations

ALBANY	ALABAMA	HIGHLAND PARK	Deerfield Shields High School
BIRMINGHAM	Malone Pool	KANKAKEE	High School
	Birmingham Athletic Club	LAKE FOREST	Lake Forest College
	Birmingham Boys' Club	LA SALLE	La Salle-Peru Township High School
	Birmingham Country Club	MONTICELLO	Hon. Allen F. Moore
	Y. M. H. A.	MT. VERNON	Park Department
CASCADE	Cascade Springs Corporation	PANA	Chataqua Assn.
TUSCUMBIA	Tuscumbia Amusement Co.	PARK RIDGE	Parish House St. Mary's Episcopal Church
ALAMEDA	CALIFORNIA	PRINCETON	Alex Anderson's Swimming Pool
ALHAMBRA	Alameda Park Co. (Neptune Beach)	QUINCY	Western Catholic Union Bldg.
BERKELEY	Alhambra Municipal Plunge	SPRINGFIELD	Knights of Columbus
BEVERLY HILLS	California School for Deaf and Blind	URBANA	University of Illinois (2 pools)
CULVER CITY	H. W. Robinson (Private Pool)	WILMETTE	Ben F. Marshall Studio
DIABLO	Thomas May (Private Pool)		
GLENDALE	Municipal Plunge	ANDERSON	INDIANA
HOLLYWOOD	Mt. Diablo Country Club	BLOOMINGTON	Municipal Pool
LONG BEACH	Glendale Swimming and Athletic Club	BROAD RIPPLE	University of Indiana
LOS ANGELES	Y. M. C. A.	EAST CHICAGO	Broad Ripple Park Co.
	Long Beach Bathhouse and Amusement Co.	INDIANAPOLIS	Todd Park
	Polytechnic High School		Highland Golf Club
	Los Angeles Athletic Club	MT. VERNON	Hoosier Athletic Club
	Jonathan Club	SOUTH BEND	Rhodius Park Pool
	Los Angeles Playgroun Dept.		Y. M. C. A.
	Part Time High School	WHITING	County Memorial Coliseum
	R. M. Taylor (Private Pool)		High School
PASADENA	Y. W. C. A.		Municipal Pool
	Brookside Plunge	CEDAR RAPIDS	Y. M. C. A.
	Pasadena Athletic and Country Club	DAVENPORT	Community House
REDLANDS	Pasadena High School	DES MOINES	Whiting High School
SAN FERNANDO	Municipal Plunge	MUSCATINE	
SAN FRANCISCO	Mission Beach Bathhouse	OTTUMWA	IOWA
SANTA BARBARA	San Fernando Coliseum Plunge	SIOUX CITY	Cedar Rapids Country Club
	Crystal Palace Baths		Municipal Natatorium
	Fleishhacker Memorial Pool	ATCHISON	Wakonda Country Club
	So. Calif. Edison Co. (Los Banos Del Mar	FORT LEAVENWORTH	Y. W. C. A.
	Bathhouse)	FRANKFORT	High School
DENVER	COLORADO	KANSAS CITY	Y. M. C. A.
	Morey, Junior High School		Knights of Columbus
	Skinner Junior High School (2 pools)	LAWRENCE	
HARTFORD	CONNECTICUT	WICHITA	KANSAS
	Capitol Park		City of Atchison Pool
	Y. M. C. A.	LOUISVILLE	St. Benedict's College
	Y. W. C. A.		Army and Navy Y. M. C. A.
NAUGATUCK	Y. M. C. A.	PADUCAH	Municipal Pool
NEW HAVEN	Yale University		Klamm Park
WATERBURY	Y. M. C. A.	MANSFIELD	Rosedale Park
WILMINGTON	Central Branch Y. M. C. A.	NEW ORLEANS	University of Kansas
WASHINGTON	DELAWARE		Wichita High School
	Wilmington Natatorium, Shellpot Park	LOUISVILLE	Elks Club
	Y. W. C. A.		
CORAL GABLES	DISTRICT OF COLUMBIA	PADUCAH	KENTUCKY
	Congressional Country Club		Crescent Hill Pool
	Potomac Park Tidal Basin	MANSFIELD	Louisville and Jefferson County Children's
	Y. W. C. A.	NEW ORLEANS	Home
ATHENS	FLORIDA		Country Club
ATLANTA	Venetian Casino Pool	AUBURN	LOUISIANA
AUGUSTA	GEORGIA	BANGOR	Mansfield Female College
LAGRANGE	University of Georgia		City Park Pool
	Atlanta Athletic Club	ANNAPOLIS	Board of Catholic Charities
	Y. M. C. A.	BALTIMORE	New Orleans Country Club
BOISE	Y. M. C. A.	HAGERSTOWN	
ARGO	IDAHO	PORT DEPOSIT	MAINE
CHICAGO	Y. M. C. A.		Y. M. C. A.
	ILLINOIS	BOSTON	Y. M. C. A.
	Argo High School	BROCKTON	
	Michael Reese Hospital Nurses' Home	CAMBRIDGE	Radcliffe College
EAST ST. LOUIS	Holy Family of Nazarus Academy	HOLYoke	High School
ELGIN	North Avenue Baths	NORTH ADAMS	Y. M. C. A.
GOLF	Sovereign Hotel	NORTHHAMPTON	Smith College
GREAT LAKES	Union League Club for Boys	WORCESTER	Y. W. C. A.
HERRIN	University of Chicago Men's Pool		Worcester Polytechnic Institute
	Y. M. C. A. Division St. Branch	BATTLE CREEK	Y. M. C. A.
	Y. M. C. A. Central Department	DETROIT	
	Y. M. C. A. Hyde Park Branch (2 pools)		MICHIGAN
	Y. M. C. A. Wilson Avenue Branch		Battle Creek Sanitarium (3 pools)
	Y. W. C. A. Central Branch		Cass Technical High School
	Knights of Columbus		Hutchins Intermediate School (2 pools)
	Y. M. C. A.		Barbour Intermediate School (2 pools)
	Warren Wright Pool		Burroughs Intermediate School
	Naval Training Station		Webster Hall
	Marlowe's White City		Women's City Club





NEW WILMINGTON  
NORRISTOWN  
PHILADELPHIA

PITTSBURGH

POTTSTOWN  
READING  
SCRANTON  
SEWICKLEY  
WILKES-BARRE

PAWTUCKET  
PROVIDENCE

CHARLOTTE

ROCK HILL  
SPARTANBURG

CHATTANOOGA  
MEMPHIS

NASHVILLE

DALLAS

EL PASO  
FORT WORTH  
HUNTSVILLE  
McKINNEY  
WACO

HOLLINS  
WINCHESTER

BREMERTON  
SEATTLE

SPOKANE  
TACOMA

BETHANY  
CHARLESTON

MATOAKA  
WHEELING

GREEN BAY  
JANESVILLE  
MADISON  
MILWAUKEE

TWO RIVERS

CHEYENNE

MONCTON

KITCHENER  
LONDON  
TORONTO

WINDSOR

Westminster College  
Y. M. C. A.  
Elks Club  
Garden Apartments  
Gerard College  
Willow Grove Park  
Woodside Park Pool  
Athletic Club  
Carnegie Technical Gymnasium  
Kennywood Park  
Pittsburgh Natatorium  
The Hill School  
Carsonia Park  
Weston Field Pool  
Y. M. C. A.  
Y. W. C. A.

**RHODE ISLAND**  
Boys' Club  
Brown University

**SOUTH CAROLINA**  
Y. M. C. A.  
Y. W. C. A.  
Winthrop Normal and Industrial College  
Municipal Pool

**TENNESSEE**  
Warner Park Natatorium  
East End Park Amusement Co.  
Memphis Country Club  
Tri-State Fair Grounds  
Y. W. C. A.

**TEXAS**  
Lake Cliff Pool  
Fair Park Pool  
Golf and Water Sports Co.  
Kidd Springs Boating and Fishing Club  
Sunset Swimming Pool  
Lake Worth Bathing Beaches  
Sam Houston Normal School  
McKinney Natatorium Co.  
Municipal Pool

**VIRGINIA**  
Hollins College  
Robert Y. Conrad Post No. 21, American Legion

**WASHINGTON**  
Army and Navy Y. M. C. A.  
Park Comm.—Green Lake  
Seattle Natatorium  
Spokane Natatorium Co.  
Stadium High School

**WEST VIRGINIA**  
Bethany College  
Luna Park  
Splash Beach Park  
J. E. Bailey Pool  
Ritchie School  
Y. M. C. A.

**WISCONSIN**  
Y. M. C. A.  
High School  
University of Wisconsin (2 pools)  
Bayview High School (2 pools)  
Washington High School (2 pools)  
Boys' Technical High School  
Elks Club  
High School

**WYOMING**  
Crystal Ice Co. Park

**CANADA**  
New Brunswick  
Academy of the Sacred Heart  
Ontario  
Y. M. C. A.  
City Pool  
Broad View Y. M. C. A.  
Eaton Girls' Club Pool  
Sunnyside Amusement Park  
Windsor Collegiate Inst.

LATUQUE  
MONTREAL

BUENOS AIRES

MELBOURNE

BALBOA  
CRISTOBAL

HANKOW  
SHANGHAI  
TIENTSIN

ROTTERDAM

MALMO

**Quebec**  
Brown Corp., Ltd.  
Montreal High School

**FOREIGN**

**Argentina**  
Jockey Club

**Australia**  
Y. W. C. A.

**Canal Zone**  
Army and Navy Y. M. C. A.  
Army and Navy Y. M. C. A.

**China**  
Hankow Club Pool  
American Country Club  
Swimming Pool

**Holland**  
Haarlem Pool, University of Holland  
Municipal Pool

**Sweden**  
Pool



W&T CHLORO BOAT

The W&T Chloro Boat has been developed to chlorinate small lakes, ponds and other bathing areas that do not have a recirculating system.

The sanitation of swimming pools is distinctly a sanitary engineering problem. Our large staff of trained specialists are always ready to study your swimming pool problem. In addition to furnishing chlorinating apparatus, we will be very pleased to forward our recommendations and quotation on filters, pumps and such other equipment as may be necessary. We will be glad to have one of our engineers call to see you upon request.

**WALLACE & TIERNAN**  
COMPANY, INCORPORATED

NEWARK, NEW JERSEY

Ptd. in U.S.A.